

Combination Intervention Ultrasounds With SNAGS Better Than Stretching For Increasing Functional Activity Non-Specific LBP Patient

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ABSTRACT

Non-specific low back pain is one of the complaints that very often encountered with a picture of complaints originating without a clear cause. Non-specific low back pain is often a reason for the limitation of functional activity in patients because of pain symptoms and muscle tightness around the patient's lower back. The aim of this research is to prove that the Mulligan intervention, namely SNAGS as the latest intervention combined with physiotherapy modalities of ultrasounds, is more effective in improving the functional quality of non-specific low back pain patients than the combination of conventional stretching interventions with ultrasounds. The research method used in this study is the design of experimental research methods in the form of a pre-test and post-test two group design. In its implementation, there will be two groups with the number of each sample in each group consisting of 16 samples selected at random with the block permutation technique. Group 1 will receive conventional stretching and ultrasounds, while group 2 will receive mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds. The patient's functional activity was measured by the MODI (Modified Oswestry Disability Index) questionnaire. The study was conducted at a physiotherapy clinic in Denpasar. The results obtained in this study after processing the Paired T-Test test data in each group to determine whether there is a significant difference between pre and post from each combination, obtained with a p value <0.05, this indicates that there is a difference significant. The difference test between groups was carried out showing that there was a significant difference between the treatment group and the control group with the Independent T-Test test, getting a p value of <0.05 which has an interpretation of a significant difference. The conclusion obtained after the test and discussion of this study is that the mulligan intervention, namely SNAGS as the latest intervention combined with physiotherapy modalities of ultrasounds, is more effective in improving the functional quality of patients with non-specific low back pain than the combination of conventional stretching interventions with ultrasounds.

Keywords: *Mulligan's SNAGS; Ultrasound; Conventional Stretching, Non Specific Low Back Pain, Decreased Functional Activity*

INTRODUCTION

The modern industrial era has started since 1996 until now, reaping as much profit as possible with the lowest possible expenditure is a motto that is commonly echoed if you want to get great profitability. The high number of requests for goods and services is directly proportional to the level of income earned by the company so that it often creates competition between companies. The competition in question is to reap profits by cutting unnecessary needs and reducing expenses, especially the salaries of white-collar employees¹.

According to statistics, white-collar employee welfare figures and company profits are often not what the media reports. Often it can be found where there is an imbalance between work tasks and unequal

income. Minor accidents stem from fatigue due to the design and work posture of the company, this problem in the initial phase can be ignored but when there is accumulation of fatigue on muscle, fatigue will result in work-related complaints known as work musculoskeletal disorders (WMDs) ².

Work musculoskeletal disorders (WMDs) are one of the complaints due to work due to fatigue of company workers in daily work activities that are fixated on static and repetitive motion. The number of work complaints in Indonesia tends to increase every year. Low back pain is one of the most common complaints of work musculoskeletal disorders (WMDs), where low back pain itself has been described as an epidemic³. Treatment given to non-specific low back pain non-pharmacologically can be in the form of mobilization and stretching and the application of ultrasound modalities⁴. Ultrasound is one of the most frequently used physiotherapy modalities and is usually combined for the efficiency of the combination given to LBP patients⁵.

Conventional physiotherapy intervention to reduce the effect of non-specific low back pain, especially on muscle tightness and pain felt is conventional stretching. Conventional stretching techniques can be done both passively and actively assisted. The purpose of the stretching technique here is to provide stretching on the target muscle so that there is relief on pain and a decrease in muscle tightness, especially the lumbar back muscle region. The conventional stretching technique here can also be combined with deep breathing to maximize relaxation and optimization while stretching. Mulligan's technique which is commonly applied to patients with low back pain in the lumbar region is the mulligan's "sustained natural apophyseal glides" (SNAGS). joints so that there will be an improvement in physiological joint mal-alignment which usually becomes a barrier in carrying out functional activities for non-specific low back pain patients ⁶.

The lack of research on the two combinations above makes researchers want to know how far the picture of the effectiveness of the Mulligan intervention, namely SNAGS as the latest intervention combined with the physiotherapy modality of ultrasounds, which from several previous studies has been proven to be more effective in improving the functional quality of patients with low back pain non-specific than a combination of conventional stretching interventions with ultrasounds.

METHODS

a. Methodology

Study design

The design used in this study was in the form of a pre-test and post-test two group design or random design.

Subjects recruitment

Subject recruitment was carried out based on the inclusion criteria, as follows: a) Subjects with non-specific low back pain according to results of physiotherapist examinations, b) Age between 40-50 years, c) Having a BMI between 18.5 – 27.0, d) Functional score moderate or severe, e) Not taking doctor's drugs, f) Non-specific low back pain has passed the acute period, g) Cooperative and willing to participate in research programs.

Sampling technique

The sampling technique used in this research is to use purposive sampling. The target population in this study took all patients who had indications of non-specific low back pain complaints obtained through physiotherapy examinations carried out. The affordable population used in this study were patients who had and have been diagnosed with non-specific low back pain who came to the I Made Niko Winaya physiotherapy clinic. Double blinding was used for this experiment to lowering the bias where both researchers either participants do not knowing which groups on the participants. Researchers utilize a computer software to apply the simple random sample technique to sampling. The formula "=RANDBETWEEN(bottom,top)" in Microsoft Excel is used to take numbers and convert them to numbers. If the previously taken number reappears, the number is deemed invalid,

and the random process is repeated, this time with the number entered such that the set odds remain the same as before.

b. Material and procedure

Group 1 will receive conventional stretching and ultrasounds, while group 2 will receive mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds. The results of the two groups were interpreted together with the results of the examination of the patient's functional activity as measured by the modified oswestry disability index (MODI). This research was conducted at a private Physiotherapy clinic in the Denpasar area from March to April 2021.

RESULTS

In the table of characteristics of the research sample which includes age, BMI, MODI values before treatment in Group 1 and Group 2 are presented in Table 1.

Table 1. Characteristic Sample Research

Characteristic	Group 1			Group 2		
	n	Mean	SD	n	Mean	SD
Age	15	45,63	2,187	15	45,44	2,220
IMT	16	23,75	1,390	16	22,75	1,483
Gender						
Man	9			7		
Woman	8			9		
Score MODI Before Intervention	16	36,45	2,834	16	35,91	1,121

Table 1 shows the descriptive results of the sample characteristics which include age, BMI, MODI value before treatment in Group 1 and Treatment Group 2. The number of subjects in each group is 16 which is in accordance with the criteria table, where in group 1 the number of subjects is male. as many as 9 people and women as many as 7 people with an age range of $45.63 \pm 2,187$. In group 2 there were 8 male subjects and 9 female subjects with an age range of $45.44 \pm 2,220$. The BMI value in group 1 was 23.75 ± 1.390 and in group 2 was 22.75 ± 1.483 . The mean MODI value before treatment in group 1 was 36.45 ± 2.834 and the mean MODI value in group 2 was 35.91 ± 1.121 with the interpretation of the MODI score before treatment was moderate disability.

The following will show the results of the normality test using the SPSS Shapiro-Wilk test and for the homogeneity test itself using the SPSS Levene's test in the intervention group 1 and intervention group 2, the results and the translation of the test values can be seen in Table 2.

Table2 Test Normality and Homogeneity

Group Data	Test Normalitas with <i>Shapiro Wilk Test</i>				Test Homogenitas (<i>Levene's Test</i>) nilai p
	Group 1		Group 2		
	Statistik	score p	Statistik	score p	
MODI Before Intervention	0,890	0,138	0,890	0,138	1,000
MODI after Intervention	0,893	0,152	0,819	0,117	0,825

In the explanation presented in Table 2, the results of the normality test using the SPSS Shapiro-Wilk test and for the homogeneity test itself using the SPSS Levene's test in the intervention group 1 and

intervention group 2 with $p > 0.05$, which means that the data in both groups are not normally distributed and homogeneous. From the results of the normality and homogeneity tests, the data were tested using a parametric statistical hypothesis test. To test the decrease in MODI scores at the time before giving a combination of interventions, group 1 will receive conventional stretching and ultrasounds interventions, while group 2 will receive mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds interventions, the Paired Sample T-test is used which aims to knowing the difference in the mean functional decline before and after the intervention. The test results are listed in Tables 3 and 4.

Table3. Score Decreasing MODI on Group 1

	Before Intervention	After Intervention	Different Mean	Score p
Group 1	36,45 ± 2,834	26,73±1,762	9,27±1,480	0,001

In Table 3, it can be seen that the results of the SPSS test, namely the Paired Sample T-test in the combination group 1 that received the conventional stretching and ultrasounds intervention treatment, the mean MODI score before the intervention was 36.45 ± 2.834 and after the intervention was 26.73 ± 1.762 .

Table 4. Decreasing Score MODI on Group 2

	Before Intervention	After Intervention	Different Mean	Score p
Group 2	35,91±1,121	15,76±2,141	19,15±0,741	0,001

In Table 4 it can be seen from the presentation of the results of the SPSS Paired Sample T-test in group 2 who received the combination of intervention 2, namely the mulligan's "sustained natural apophyseal glides" (SNAGS) intervention and ultrasounds in the mean MODI score, there were differences in the intervention before the combination of mulligan's intervention "sustained natural apophyseal glides" (SNAGS) and ultrasounds and after intervention mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds with a mean of 35.91 ± 1.121 before and after 15.76 ± 2.141 with a p value of 0.001 ($p < 0.05$).

Test Comparison of the results of the difference in mean MODI scores on non-specific low back pain before the intervention combination and after the intervention combination in groups 1 and 2 was measured by the SPSS Independent t-test, which is presented in table 5.

Table5 Result test *Independent T-test*

	Group	N	Diffence Mean± SD	Score p
Score MODI Before Intervention	Group 1	16	36,45 ± 2,834	
	Group 2	16	35,91±1,121	
Score MODI After Intervention	Group 1	16	9,27±1,480	0,003
	Group 2	16	15,76±2,141	

Table 5 describes the results and explanation of the SPSS independent t-test which aims to determine the mean comparison of the reduction in MODI scores in the two groups, where the interpretation is that the greater the MODI score obtained from the difference between the decrease in the pre-test and post-test on the MODI score shows the results. which is better in an effort to improve function in patients. In the table,

it can be seen that the difference in the decrease in MODI scores in group 1 was (9.27 ± 1.480) or 25.65% and group 2 was (19.15 ± 0.741) or 54.28% of the patient's functional improvement.

DISCUSSION

In Table 3, it can be seen that in the combination group 1 that received the conventional stretching and ultrasounds intervention treatment, the mean MODI score before the intervention was 36.45 ± 2.834 and after the intervention was 26.73 ± 1.762 . With a value of $p = 0.001$ ($p < 0.05$) which indicates a significant difference between the MODI scores before the intervention combination of conventional stretching and ultrasounds and after the intervention of conventional stretching and ultrasounds. This value can be interpreted as an interpretation and proves that the combination of the two interventions applied to group 1, namely conventional stretching and ultrasounds, can improve function in patients with non-specific low back pain.

The results of this study are supported by research from Abbas and Sultana (2014) which describes the effectiveness of stretching in cases of lower back pain. In this study, it was explained that stretching is one of the conventional techniques to increase flexibility in the muscles where in its application it is carried out with a focus on one target muscle⁷. The physiological effects of stretching can affect muscle tightness and instantly increase muscle flexibility due to the adaptive response of the sarcomere response in the lower back pain muscle so that later pain relief will occur which will reduce patient limitations⁸.

Table 4 indicate a significant difference between before intervention mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds with after intervention mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds and prove that both combinations can improve function in non-specific patients. low back pain⁹.

There are similarities in the results of a study conducted by Alagesan (2011) regarding the effects of Mulligan's SNAGS in patients with complaints of non-specific low back pain. In the presentation of his research, the effect of the SNAGS mulligan which has a mechanical effect is described where there is an increase in the range of motion of the joints in patients with non-specific low back pain¹⁰.

Both combinations of interventions use one of the Ultrasound physiotherapy modalities in their implementation. The administration of ultrasound (US) with intermittent (pulsed) waves can help facilitate the faster formation of new tissue. Physiological effects on connective tissue after the use of ultrasound have proven to be effective with the facilitation of a healing agent, namely histamine from mast cells, so that it can reduce pain and limitation of motion which is one of the symptoms and the biggest limitation in patients with non-specific low back pain.

Table 5 describe that the difference in the decrease in MODI scores in group 1 was (9.27 ± 1.480) or 25.65% and group 2 was (19.15 ± 0.741) or 54.28% of the patient's functional improvement. In addition, the obtained p value = 0.003 ($p < 0.05$) which proves that the mulligan intervention, namely SNAGS as the latest intervention combined with ultrasounds as a physiotherapy modality, is more effective in improving the functional quality of non-specific low back pain patients than the combination of conventional stretching interventions with ultrasounds.

This result is supported a study conducted by Luomajoki in 2012 which proposed a theory regarding the significant difference between conventional stretching and mulligan's SNAGS. The problems that often occur in cases of non-specific low back pain often only focus on symptoms, namely on pain due to tightness of the lower back muscles without eliminating the source of the tightness that occurs¹¹.

Hindalگو (2014) in his research explains the need for comprehensive action from source oriented or the source of the problem from LBP, namely changes in malalignment or posture that occur in low back muscles due to motion compensation, or awkward posture carried out during conventional activities every day¹².

According to Lopez (2015) explains the effect of malalignment that affects the imbalance of the lower back region due to the biomechanics of the position so that the lower back muscle will receive stress eccentric contraction to maintain posture¹³. In short, the problem of muscle fatigue from changes in posture is seen as a minor movement, but in reality it is often a rare factor to be analyzed in order to get a comprehensive treatment of the source problem related to lower back biomechanical abnormalities¹⁴.

The theory of the Sherrington principle as one of the pioneers of the concept of proprioceptive neuromuscular stimulation in the human body to control motion in the human body explains that imbalance in the lower back muscles will result in a complete change in posture in the lumbosacral joint, hip joint and pelvic joint region¹⁵. Cases such as scoliosis, lumbar hyperlordosis, lower back syndrome or commonly known as lower quadrant syndrome will clearly provide biomechanical changes to the frontal muscles such as hip flexors, abdominal muscles, back muscles to gluteus muscles so that there are inactive or weak muscle regions and overactive or over tight muscles¹⁶. The important role of mulligan is to normalize and activate inactive muscles which cannot be done by conventional stretching which only focuses on intervening tight muscles¹⁷.

Proprioceptive stimulation of muscle spindles or Golgi Tendon Organs in muscles is more efficient in the mulligans intervention, SNAGS, which combines a combination of functional active movements in patients with accessory movements, namely passive movements applied by physiotherapists¹⁸. It is hoped that there will be neurological adaptation in the lower back region to be able to reactivate the core muscles and reduce compensation in the lower back muscles¹⁹. This effect was not found in the stretching intervention, which only focused on stretching the extensibility and flexibility of the muscles, resulting in a functional increase that could not match the intervention²⁰.

CONCLUSION

Both types of intervention combinations, both the combination of SNAGS mulligan with ultrasound physiotherapy modality and the combination of conventional stretching with ultrasound each can improve functional quality in patients with non-specific low back pain. However, when compared to the mean difference in functional improvement resulting from the data obtained, the results of the combined SNAGS and ultrasound mulligan intervention were better for improving patient function. Research hoped this study can provide an academic contribution to the concept of using conventional interventions such as stretching, mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds in the case of patients with non-specific low back pain, can be used as a reference in developing further research on low back pain problem and hoped this study can be considered by physiotherapists for considering applying mulligan's "sustained natural apophyseal glides" (SNAGS) and ultrasounds as a new intervention that more efficient and effective in cases of non-specific low back pain patients.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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